Circular No. 10.

United States Department of Agriculture,

DIVISION OF STATISTICS.

U. S. Department of Agriculture,
Office of the Statistician,
Washington, D. C., August 19, 1899.

Sir: I have the honor to transmit herewith a report on the Brazos River (Texas) flood of June-July, 1899, and its effects upon the agriculture of the region submerged, prepared under my direction by Mr. E. S. Holmes, jr., of this Division, who has personally visited all the principal points in the district.

The thanks of the Department are due to various county officials, members of relief committees, bankers, cotton factors, merchants, owners of plantations, railway officials, representatives of the press, and other persons for valuable assistance rendered Mr. Holmes in the course of his investigations. In some cases the service so rendered was of such value as to seem to call for special mention, but where everyone was so desirous of rendering service and showing courtesy it would be invidious to discriminate.

I respectfully recommend the publication of the report as Circular No. 10, Division of Statistics.

Respectfully,

John Hyde,
Statistician.

The Secretary of Agriculture.

THE BRAZOS RIVER (TEXAS) FLOOD OF JUNE-JULY, 1899, AND ITS EFFECTS UPON THE AGRICULTURE OF THE SUBMERGED REGION.

The two recent floods in the valley of the Brazos River (Texas), the first reaching its maximum height on June 29 and the other following after an interval of less than one day and attaining its highest point on July 1, came so nearly together as to be commonly known as one flood. There was a distinct interval, however, of almost a day between the two periods of high water, and during that time the river in the northern portion of the district sank nearly to its low-water mark. The first flood resulted from a four days' rain, beginning June 26, which in some localities partook of the nature of cloud-bursts, and this being followed after a short interval by phenomenally heavy rains for four or five days more, so swelled the Brazos River and its tributaries as to tax them beyond their carrying capacity and cause a flood which inundated the rich bottom lands to a depth of from 2 to 20 feet over an area of about 2,300 square miles, and of an average duration of about eight days.

Records of the Weather Bureau show that during the month of June for the past twelve years rains of over 10 inches occurred but nineteen times in Texas, or less than two each month, while during June of this year twelve stations reported over 10 inches in four days; Turnersville

reported over 33 inches and Hearne over 30 inches. It is a remarkable fact that the heaviest rains occurred so far from the Gulf; it is also remarkable that more than 80 per cent of the stations reporting over 10 inches of rain in a single month within the past twelve years have been 50 miles or more from the Gulf, and that the heaviest rains have fallen on lands ranging from 500 to 2,000 feet above the sea level, and this may be considered an important factor in the creation of the storms. In this connection the following explanation, by Prof. H. A. Hazen, of the United States Weather Bureau, may be of interest:

It is a remarkable fact that no serious disturbance of the atmosphere is indicated on the twice-daily maps. On the morning of June 27 a slight disturbance is noted between Corpus Christi and Galveston, with a southeast wind of 36 miles an hour at the latter station. Galveston reported 2.02 inches of rain in the previous twelve hours, but it is the only station that had any rain. On the evening of the 27th Galveston had 0.68, and but for 0.02 the next morning and 0.26 the evening of 30th there was no more rain at this station. At this time also (evening of 27th) the winds all along the Gulf were from southeast, showing that the slight disturbance was wholly within the State. Throughout these heavy rains the wind at Palestine (the nearest station to the heaviest rains) continued steady from the northeast and at 8 miles an hour, except 12 miles on the evening of 27th. The total rain at Palestine was 7.42 inches. The lowest pressure noted was 29.74 inches at Galveston on the evening of the 26th, and at Palestine at the same moment it was 29.86 inches. It is a remarkable fact that the pressure rose steadily at Palestine throughout this period, except for a slight fall on the evening of the 29th, which was due mostly to the regular diurnal range.

In seeking for an explanation of such a very remarkable phenomenon, and so localized, we are forced to acknowledge a dearth of facts bearing upon the condition of the atmospheric strata which can produce such a downpour. The onward advance of a high pressure from the north caused winds from a northerly direction, which, impinging upon those from the south or southeast, caused some of the rain. Also the topography must have had some effect. It must be said that, after allowing for all the conditions, we still have a most serious difficulty in accounting for such rains which are analogous to so-called cloud-bursts, about which almost nothing is known.

There have been several overflows prior to this time, notably those of 1833, 1843, 1852, and 1885. The present flood, however, was the most disastrous in all respects ever known in the Brazos Valley. The area under cultivation has more than doubled since the flood of 1885. Previous floods have generally come in April or May, allowing farmers ample time to replant and make good crops, and the main loss consisted of the extra labor necessary to replanting, but the lateness of the recent overflow almost prohibits the replanting of cotton and corn.

The land bordering on the Brazos River is largely composed of rich alluvial soil, and there are thousands of acres of what is probably the finest cotton land in the world. Few agricultural regions present so fine an appearance as these alluvial lands presented prior to the flood. The traveler could pass for miles through broad, level farms, planted almost to the water's edge in cotton, corn, sugar cane, and other crops.

The greatest damage was in McLennan, Falls, Milam, Robertson, Brazos, Burleson, Grimes, Washington, Waller, Austin, Fort Bend, and Brazoria counties. The creeks in Hood, Somervell, and Johnson counties—in fact, those of the entire southern and central portions of Texas—were all out of their banks, and the fact that no great damage was done in that region is due to the nature of the land, which is roll-

ing and in some parts mountainous, so that the overflow was confined to a comparatively small area.

Cotton planters have been the chief losers, as 67.4 per cent of the entire area under cultivation was planted in that staple. There were also large losses of corn, including, besides the growing product of the flooded area, a considerable amount of last year's crop which was stored for feed.

Sugar-cane plantations have also suffered severely, and the crop has been damaged nearly 40 per cent. A considerable area was also planted in melons and small fruits, concerning which no satisfactory data are available.

Large numbers of live stock were drowned, and it is reported that all farm animals which stood in the water any considerable length of time were so swollen and blistered that the skin is coming off, and many more will probably die.

Many of the fences and small tenant houses have been washed away, and numbers of those left standing are not in fit condition for use and will have to be almost rebuilt. Farm implements were also damaged to a certain extent, but few were washed entirely away, as their heavy weight, in proportion to the surface presented to the action of the water, prevented their being carried any great distance. Hundreds of people are in a destitute condition, and large numbers of these are being supplied with rations through the generosity of the landowners and of public-spirited citizens from all sections of the country. The chief sufferer, however, from a monetary point of view, is the landowner and not the tenant. The tenant began with nothing; he comes out of the flood in the same condition, and will regain his footing long before the owner of the plantation, who will have to pay for the supplies that have been consumed by his tenants while cultivating the crops which have been lost. The landowner, furthermore, has no hope of ever receiving the rent of his land for this year; in fact, the majority of landlords have told their tenants to take the land rent free and make what crops they could during the remainder of the season, even going so far in most instances as to furnish fresh seed for the tenant to plant. This is done partly to keep the tenant from leaving the plantation and partly to prevent the growth of weeds and prepare the land for next year's crop.

In some sections the land was badly washed, and there were numerous sand deposits. Where these deposits were heavy it will require years to get the soil into condition for planting again. The area thus damaged was fortunately a small one, and the loss sustained was largely counterbalanced by rich deposits of silt and dried vegetation, which will greatly add to the productiveness of the soil, particularly over the older portion of the land, much of which has been in constant cultivation for a number of years without any other fertilizer than that provided by nature.

All the towns on the immediate river bottom suffered considerably from high water and deposits of mud, but there was no great damage to them except in small settlements in low-lying parts. The influence of the flood, however, will long be felt in these communities, as nearly the entire volume of their business is so directly dependent upon the cotton crop that any interference with the production of that staple must result in an almost complete stagnation of business. There was also a serious amount of damage to roads and bridges, the amount of which can not be even approximately estimated. The loss to railroad property is estimated at about $1,000,000.

In the outlying districts there was a great deal of suffering from hunger and exposure during the early days of the flood, and notwithstanding the fact that rescue parties were promptly in the field, many of the sufferers remained on housetops and in trees for several days without food or shelter. In view of these conditions, the low death rate was little short of miraculous, the total number of deaths from drowning being less than 40. This low death rate is largely due to the promptness with which rescue parties were organized and the efficiency of their work.

Although the relief committees are supplying medicines, and the physicians throughout the district are offering their services gratuitously, there will doubtless be a great deal of sickness, and probably many deaths from the poisoning of the air by the decaying of animal and vegetable matter, evaporation of stagnant water, and also from the lack of proper food.

The problem of making the flooded section self-sustaining until another crop can be produced is a difficult one. Steps are being taken, however, to plant portions of the territory in food and forage crops which yield a quick return. This will serve to keep the land in good condition for next year's crop and may ultimately result in a greater diversification of crops, which can not fail to benefit a district where an abundant yield is assured by a mere scratching of the earth and dropping of seed.

The total area covered by the flood was about 2,300 square miles. This region contained, as nearly as can be estimated in view of the somewhat indefinite boundary lines of the flood, a population of about 100,000, in which, in the strictly rural sections, the colored population predominated, outnumbering the whites in the ratio of about 4 to 1. This estimate of population is based on the reports of the principal landowners throughout the district, and indicates an increase of about 25 per cent since the census of 1890.

The difficulty of making a distinction between the land of the large owner who cultivates his own farm and that operated under the tenant system, and the lack of trustworthy data in regard to the amount of land placed under cultivation and split up into small farms, almost precludes the making of an accurate estimate of the number of farms in the flooded district; but an estimate based upon the figures of the

Eleventh Census, and which may be assumed to be fairly correct, indicates that there are in the flooded district about 8,100 farms, containing a total area of about 1,383,350 acres, 36.3 per cent of which were under cultivation at the time of the flood. The aggregate value of these farms, with their improvements, amounted to about $20,000,000, of which $16,322,000, or 81.6 per cent, represents land value, and $3,678,000, or 18.4 per cent, represents the value of fences, buildings, etc. The value of the implements and machines used in the cultivation of this area is estimated to be $364,000.

Of the improved area, 339,000 acres were this year devoted to cotton, 124,400 to corn, and 39,400 to other crops, the exact proportions of which could not be even approximately estimated. The 339,000 acres devoted to cotton would probably have produced, under conditions similar to those which existed prior to the flood, about three-fourths of a bale of cotton to the acre, making a total production of 254,000 bales, with an estimated value of 4½ cents per pound, or $5,715,000 for the entire crop.

The area devoted to corn would probably have produced under similar conditions 4,978,000 bushels, worth, at 20 cents per bushel, $995,600; and it is estimated that the product of the 39,400 acres planted in other crops would have been worth at least $1,246,000, the major portion of which, $900,000, is the valuation of the sugar cane on 10,800 acres of the land. This is the entire cane area of two counties, and, while it does not represent the total area devoted to that crop in the devastated district, it nevertheless gives a fair idea of the relative value of the crop.

The live stock on hand at the time of the flood was valued at $2,954,455, and was divided as follows: 26,639 horses and mules, valued at $65 per head; 43,260 cattle, with an average value of $20; and 59,620 swine, worth $6 each. These values may seem somewhat high, but in view of the recent advance in prices and the superior breeds of animals in the inundated district this estimate is believed to be quite conservative.

It is estimated that of the crops of last year none remained on hand except some 635,500 bushels of corn, valued at $127,100. The new crop was about ready to harvest and farmers had nearly exhausted their reserve.

The damage to the land by washing and gullying is estimated to be $209,500, or 1.3 per cent of its total value. This is partially offset, however, by an increase to the value of the land by alluvial deposits, estimated at $100,750, leaving a net loss of $108,750, or 0.7 per cent of the total value of the land. Losses from damage to fences and buildings were much more serious, many houses and fences being carried entirely away and all improvements in the flooded territory being damaged to a greater or less extent.

The total damage to improvements amounted to $294,800, or 8 per cent of their aggregate value. The loss from damage to implements and machines was $18,500, or 5.1 per cent of their total value. This is

mainly an indirect damage, as but few implements were carried away, and the injury can be practically repaired by expending the time and labor necessary to the collection of scattered implements and to cleaning and putting them in proper condition for use.

Although the loss of live stock was serious, it was not nearly so heavy as was at first reported; many animals that were supposed to have been lost were afterwards recovered, sometimes at places remote from their homes. The loss in value of live stock is estimated at $333,138, or 11.3 per cent of the total value of the stock on hand at the time of the flood. Of the 635,500 bushels of old corn on hand when the overflow occurred, 443,100 bushels, with an aggregate value of $88,620, were totally destroyed. This represents 69.7 per cent of the aggregate value of the old corn on hand at the time of the flood.

What effect the flood will have upon this year's crops is difficult to estimate. While the crops of an immense area were practically destroyed, the effect of the rains on the upland crops will he highly beneficial and should result in a large increase in yield for the entire central and western part of the State. Cotton is, of course, the principal crop in this region, and the counties in which the flood occurred are among the largest cotton-producing counties in the United States with regard to average yield per acre. It is asserted by planters that crops in this section never looked better than they did just before the present flood, and that prospects for an abnormally large yield were very encouraging.

Of the 428,450 cultivated acres devastated by the flood, 292,450, or 68.3 per cent, were devoted to cotton, and, in the opinion of planters and cotton factors, would have produced 226,950 bales, or 0.776 of a bale per acre, the value of which, at an average price of 4½ cents per pound, would have amounted to $5,106,375, or 89.4 per cent of the total value of the cotton crop of the flooded area.

Of the 124,400 acres devoted to corn in this region, 109,150, or 87.7 per cent, were entirely destroyed. The estimated crop of this area would have amounted to 4,366,000 bushels, valued at $873,200; and the value of the probable product of the 26,850 acres devoted to other crops is estimated at $589,200, of which $335,000, or 56.8 per cent, is for sugar cane grown on 7,400 acres. Losses of sugar cane would be much heavier were it not for the fact that the cane which was prevented from maturing for this year's crop has been cut down and promises to make a fair crop as seed for next year's planting. The cane on this land will ordinarily yield from 24 to 30 tons per acre, and the product is worth from $3 to $3.25 per ton.

The total loss to crops amounted to 428,450 acres, or 85.2 per cent of the total area planted in the district, with an aggregate value of $6,568,775, or 82.6 per cent of the total value of the crops which would in all probability have been grown in the devastated region had they fulfilled the promises made before the flood. In this connection it is interesting to note the difference in the conditions of cotton and corn

between August 1 and before the flood in the counties where the greatest damage occurred, as shown by the returns of the correspondents of the Division of Statistics. Returns for August 1 have been received from but eight of the counties. As regards cotton, all counties from which reports were received show a decrease in condition during the month. McLennan County shows a decrease of 10 per cent, Milam 10, Robertson 5, Grimes 15, Washington 22, Waller 42, Austin 22, Fort Bend 45, and Brazoria 58, and the average for the entire district indicates a decrease of 16 per cent.

In corn the decrease in condition during the month was materially less. In McLennan County the condition remains the same as last month. Grimes and Austin counties report increases of 7 and 14 per cent, respectively, and the remainder of the counties reporting show decreases as follows: Milam and Waller 15 per cent each, Washington 3, Fort Bend 60, and Brazoria 20, while the average decrease for the entire district is 8 per cent.

It has been found impossible to make even an approximate estimate of the loss of household effects, owing to the lack of trustworthy data relative to that subject. It may be stated, however, that the furniture of the tenant's cabin was of the most primitive character and of almost no value to anyone but himself.

The estimated total loss to farm property and products was $7,412,583, or about $74 for each person in the district, and 23.6 per cent of the total value of farm property and prospective crops for this year.

No attempt has been made to fix the loss on any particular class of people, but a certain portion of the value of the crops in the flooded region would have gone to the landowner. The system of tenant farming is such that the landlord is practically compelled to furnish household supplies to his tenants in advance of the gathering of the crop. To do this he either buys such supplies outright or makes himself responsible to the merchant for supplies furnished his tenants, and during harvest he pays or arranges for the payment of the extra hands required for cotton picking or the harvesting of other crops. When the crops are harvested they are turned over to the landlord, who sells them to the merchant, or cotton factor, and after reimbursing himself for the rent of his land and the advances made, turns over the balance to the tenants.

It is estimated that the landlord has already advanced on this year's crop $756,000 to tenants in the devastated region, in addition to which the rent of his land would have yielded him $1,759,000 had the crops matured, making a direct loss to the landlord of $2,515,000, to which he has entirely given up his claim. The tenant system is practiced largely on account of the high price of labor, the usual charge for a day's work being 50 cents and board, but convict labor, notwithstanding the State exacts payment at the rate of $17 per month, with board, for an able-bodied man, is employed on many of the large plantations.

The amount of land that will be replanted has been variously esti-

mated, and no definite figures can be given at this time. It is safe to assume, however, that not more than 50 per cent of the total area will be replanted, and very little of that in cotton, probably not over 20 per cent. The balance will be planted in quick-yielding food and forage crops, which, as has already been said, may cause a movement toward a greater diversification of products and more scientific farming.

The following gives estimates of the property damaged in the flooded district:

Estimated number and acreage of submerged farms.

Estimated number of farms	8,100
Estimated number of acres in farms	1,383,350

Estimated acreage, production, and value of principal crops.

	Acres.	Production.	Value.
Cotton	339,000	[1] 254,000	$5,715,000
Corn	124,400	[2] 4,978,000	995,600
Other crops [3]	39,400	.....	1,246,000
Total	502,800	.....	7,956,600

[1] Bales. [2] Bushels. [3] Includes 10,800 acres of sugar cane, valued at $900,000.

Estimated value of farm property in the flooded territory.

Estimated value of land		$16,322,000
Estimated value of improvements		3,678,000
Estimated value of implements and machines		364,000
Estimated number and value of live stock on hand:		
Horses and mules (26,639)	$1,731,535	
Cattle (43,260)	865,200	
Swine (59,620)	357,720	
Estimated total value of live stock		2,954,455
Estimated quantity and value of corn on hand (635,500 bushels)		127,100
Estimated total value of farm property		23,445,555

Losses caused by the flood.

Estimated loss to farm property:		
Damage to land		$209,500
Less probable increase to value of land by alluvial deposits		100,750
Net loss to land		108,750
Damage to improvements		294,800
Damage to implements and machines		18,500
Live stock:		
Horses and mules (2,235)	$145,250	
Cattle (4,715)	94,300	
Swine (15,598)	93,588	
Total loss of stock		333,138
Corn on hand (443,100 bushels)		88,620
Estimated total loss to farm property		843,808
Loss to crops:		
Cotton (acres, 292,450; production, 226,950 bales)	$5,106,375	
Corn (acres, 109,150; production, 4,366,000 bushels)	873,200	
Other crops (26,850 acres)*	589,200	
Total loss to crops (428,450 acres)		6,568,775
Estimated grand total of losses		7,412,583

* Includes 7,400 acres of sugar cane valued at $355,000.